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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,125	08/28/2001	Gurtej Singh Sandhu	303.676US5	7117

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EXAMINER

SPERTY, ARDEN B

ART UNIT	PAPER NUMBER
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1775

43

DATE MAILED: 02/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/941,125

Applicant(s)

SANDHU ET AL.

Examiner

Arden B. Sperty

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1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 51-56 and 60-85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 51-56, 60-85 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 51 and 53 are rejected under 35 U.S.C. 102(a) as being anticipated by Kirlin et al. (USPN 6,320,213).

3. Kirlin teaches a TiSiN or TiAlN layer overlying the walls and exposed base layer of a contact hole, as well as a tungsten or aluminum fill coupled to the titanium alloy layer (col 10, lines 26-28; col 2, lines 29-31), wherein the insulating layer is silicon dioxide.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin as applied to claim 51 above, and further in view of Ohta et al (USPN 5,229,643).

Kirlin teaches the above structure but is silent with respect to using zinc as an alternative alloy material. Ohta teaches a CVD method of depositing titanium using zinc and titanium, which produces a titanium alloy layer containing zinc (col 10, lines 46-50) used as a conductor in a semiconductor device. It would have been obvious to one skilled in the art at the time the

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invention was made to use zinc as an alloy material so as to take advantage of the alloy's conductive properties.

overcome 6.  
by amend to  
claims 53  
& 55-56

Claims 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin as applied to claim 53 above, and further in view of Dixit et al (USPN 4,884,123).

With respect to claims 54-56, Kirlin teaches the above structure but is silent with respect to a TiN layer interposed between the titanium alloy and the fill. Dixit teaches the use of a TiN layer between a titanium-containing layer and a tungsten fill as a barrier to silicon diffusion (col 4, lines 39-40). It would have been obvious to one skilled in the art at the time the invention was made to use a TiN layer as a barrier against the diffusion of silicon.

overcome by  
amend to  
60, 66, 73,  
78

Claims 60, 62-66, 68, 70-73, 75, 77-79 and 81-85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin in view of Dixit as applied to claims 54-56 above, and further in view of Todorobaru et al (USPN 6,031,288).

Kirlin and Dixit teach the above structure but are silent with respect to a titanium silicide layer. Todorobaru teaches the same structure applied to a high aspect ratio contact opening (col 18, lines 41-45) on a silicon superconductor substrate. This structure, when heat treated, forms a titanium silicide film providing a stable contact for subsequent layers (col 14, lines 40-66). It would have been obvious to one skilled in the art at the time the invention was made to form a titanium silicide film because it is a stable contact for subsequent layers.

With respect to claim 78, It is the examiner's position that the structure of Kirlin in view of Todorobaru is identical to or only slightly different than the structure prepared by the method of the claim(s), because of structural similarities. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product

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itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. The burden has been shifted to the applicant to show obvious difference between the claimed product and the prior art product.

7. Claims 61, 67, 74 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin in view of Todorobaru as applied to claims 60, 66, 73 and 78 above, and further in view of Ohta.

Kirlin and Todorobaru teach the above structure but are silent with respect to using zinc as an alternative alloy material. Ohta teaches a CVD method of depositing titanium using zinc and titanium, which produces a titanium alloy layer containing zinc (col 10, lines 46-50) used as a conductor in a semiconductor device. It would have been obvious to one skilled in the art at the time the invention was made to use zinc as an alloy material because of the alloy's conductive properties.

8. Claims 69 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin in view of Todorobaru as applied to the claims 66 and 73 above, and further in view of Doan et al. (USPN 5,976,976).

Kirlin teaches the insulating layer to be SiO<sub>2</sub> but is silent with respect to the use of borophosphosilicate glass (BPSG) as an insulating layer.

Doan teaches BPSG or SiO<sub>2</sub> as functionally equivalent insulating layers in a structure comprising a silicon base layer, a titanium-containing first layer, a titanium silicide second layer, a TiN barrier layer and a fill material (col 3, lines 42-43). It would have been obvious to one

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skilled in the art at the time the invention was made to substitute BPSG for SiO<sub>2</sub> because they are functionally equivalent insulating materials.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arden B. Sperty whose telephone number is 703-305-3143. The examiner can normally be reached on M-R, 08:00-16:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822.



abs  
February 11, 2002

  
DEBORAH JONES  
SUPERVISORY PATENT EXAMINER